

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 11321-P067WO		FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/US2004/019414		International filing date (day/month/year) 18.06.2004	Priority date (day/month/year) 20.06.2003	
International Patent Classification (IPC) or national classification and IPC C07C69/54, C07C69/96, C07C22/04, C07C49/80, C07C233/15, C07C271/28, C08F36/20, C09K21/14				
Applicant WILLIAM MARSH RICE UNIVERSITY et al				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (Indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and Industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 11.01.2005		Date of completion of this report 26.09.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer O'Sullivan, P Telephone No. +31 70 340-		



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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

21 as originally filed

Claims, Numbers

1-32 as originally filed

Drawings, Figures

1-6 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- ☐ the entire international application,
 - ☒ claims Nos. 1,8,13,18,23,28 partially
because:
 - ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):
 - ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
 - ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
 - ☒ no international search report has been established for the said claims Nos. 1,8,13,18,23,28 partially
 - ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
 - the written form ☐ has not been furnished
 - ☐ does not comply with the standard
 - the computer readable form ☐ has not been furnished
 - ☐ does not comply with the standard
 - ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
 - ☒ See separate sheet for further details

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-32
	No: Claims	
Inventive step (IS)	Yes: Claims	1-32
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-32
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

The following documents are referred to in this communication:

- D1: JURS J L ET AL: "Novel flame retardant polyarylethers: synthesis and testing" POLYMER, ELSEVIER SCIENCE PUBLISHERS B.V, GB, vol. 44, no. 13, June 2003 (2003-06), pages 3709-3714, XP004428313 ISSN: 0032-3861
- D2: DATABASE BEILSTEIN BEILSTEIN INSTITUTE FOR ORGANIC CHEMISTRY, FRANKFURT-MAIN, DE; XP002303923 Database accession no. 8066979
- D3: DATABASE BEILSTEIN BEILSTEIN INSTITUTE FOR ORGANIC CHEMISTRY, FRANKFURT-MAIN, DE; XP002303924 Database accession no. 1995713

Re Item III.

Present claims 1,8,13,18,23,28 relate to an extremely large number of possible monomers, polymers and flame retardant materials. Support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT is to be found; however, for only a very small proportion of the monomers, polymers and flame retardant materials claimed. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Consequently, the search has been carried out for those parts of the claims which appear to be supported and disclosed, namely those parts relating to the monomers, polymers and flame retardant materials in which the "*polymerizable unit*" is one of the moieties 1-11 referred to in claim 6. Consequently, the term "*attached to the polymer backbone through Y²*" has searched insofar as Y³ is the polymerized equivalent of monomers containing one of the polymerizable units 1-11.

Documents D2 and D3, cited in the search report for information, illustrate two monomeric compounds having potentially "polymerizable" groups falling under the scope of the present claim set, but not the searched subject-matter.

The present opinion is therefore *based solely on searched subject-matter.*

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The document D1 (cited in the application, published in June 2003 and available online since 10 May 2003) is regarded as being the closest prior art to the subject-matter of claims 1-32, and discloses flame retarding polyarylethers based, like the present application, on derivatives of bisphenol C (see D1, schemes 1-3). Scheme 3 discloses the polymerization of a bisphenol C derivative containing symmetrical polyxmerizable units on each of the two phenyl rings. The monomers of the present application are asymmetric, having a polymerizable group chosen from the polymerizable moieties 1-11 on only one of the two phenyl rings. Claims 1-7, 16-17 and 23-27 are therefore novel over D1. The polymers of D1 (scheme 3, compound C) comprise the bisphenol C derivative incorporated into the polymer backbone. the polymers of the present application however comprise the bisphenol C derivative pendant to the polymer backbone (see present application, figure 1). Claims 8-12 and 28-32 are therefore considered novel over D1. Flame retardant materials and methods for the forming thereof using said novel polymer are new. Claims 13-15, 18-22 are therefore considered novel.

In summary, all claims 1-32, insofar as they have been search (see Item III) are considered novel.

Inventive Step (Art 33(3) PCT)

The difference between the present application and D1, already identified above is the unsymmetrical nature of the monomers in the former. The monomers of the present application allow the formation of polymers in which the monomer is a pendant group rather than being incorporated into the polymer backbone as disclosed in D1. The skilled person received no teaching nor hint from the subject-matter of D1 that would incite him to make such a change resulting in the present subject-matter. Claims 1-32 are therefore considered inventive.

Item VIII.

1. Claim 6 contains a reference to the description in that it refers to "polymerizable moieties 1-11". According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.
2. There appears to be a number of clerical errors in claims 24-27. Claims 24-26 depend on independent claim 23. The term "polymer of claim 23/24/24" has been

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interpreted as "the *monomer* of claim 23". Claim 27, in addition to the above error, in dependent on claim 22, a method claims. This claim has been interpreted as being dependent on claim 23.